

MAXIMUM PITCH OF STAY-BOLTS—III

For fire-boxes, furnaces and back-connections:

$$p = \sqrt{\frac{T^2 \times 112}{P}} \text{ for } \frac{7}{16} \text{-inch plate and less,}$$

$$p = \sqrt{\frac{T^2 \times 120}{P}} \text{ for plate over } \frac{7}{16} \text{-inch thick.}$$

In these formulas, p = pitch or spacing of stay-bolts in inches; T = thickness of boiler plate expressed in sixteenths of an inch—for example, if plate thickness is $\frac{1}{4}$ -inch, $T = 14$; P = gage pressure in pounds per square inch.

The table below is calculated from these formulas, with some modifications.

For boiler heads the formula is $p = \sqrt{\frac{T^2 \times 140}{P}}$.

When the stay-bolts in the boiler heads are provided with a washer riveted to the head, having a thickness of at least one-half of the thickness of the head-plate, and a size equal to at least seven-eighths of the spacing of the stay-bolts, or when the heads have a reinforcing plate riveted either on the inside or outside, covering the area stayed and equal in thickness to at least one-half of the head-plate, then

$$p = \sqrt{\frac{(T + t \times 0.8)^2 \times 200}{P}}$$

in which t = thickness of washer or reinforcing plate in sixteenths of an inch. This formula can also be used when the head is fitted with angle iron, riveted to the head, the thickness of the angle iron being at least two-thirds of the thickness of the head-plate, and the depth of angle at least equal to one-quarter of stay-bolt spacing, t being thickness of angle iron in 16ths inch.

Gage Pressure	FIRE-BOXES, FURNACES AND BACK-CONNECTIONS												BOILER HEADS											
	Thickness of Plate, Inches													Thickness of Plate, Inches										
	1/16	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/16	1 1/8	1 1/4	1 1/2	1 5/16	16	16	16	16	16	16	16	
80	.7	8 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
90	6 1/2	7 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
100	6 1/2	7 1/2	8 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
110	6	7 1/2	8 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
120	5 1/2	6 1/2	8	9	10	10	10	10	10	10	10	10	10	10	10	16	16	16	16	16	16	16		
130	5 1/2	6 1/2	7 1/2	8	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
140	5 1/2	6 1/2	7 1/2	8	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
150	5 1/2	6	7 1/2	8	8 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
160	5	5 1/2	6	7 1/2	8	8 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
170	4 1/2	5 1/2	6 1/2	7 1/2	8	8 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
180	4 1/2	5 1/2	6 1/2	7 1/2	8	8 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
190	4 1/2	5	5 1/2	6 1/2	7 1/2	8	8 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
200	4 1/2	5 1/2	6 1/2	7 1/2	8	8 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
210	4 1/2	5 1/2	6	6 1/2	7 1/2	8	8 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
220	4 1/2	4 1/2	5 1/2	5 1/2	6	6 1/2	7 1/2	8	8 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
230	4 1/2	4 1/2	5 1/2	5 1/2	6	6 1/2	7 1/2	8	8 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
240	4 1/2	4 1/2	5 1/2	5 1/2	6	6 1/2	7 1/2	8	8 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		
250	4	4 1/2	5 1/2	5 1/2	6	6 1/2	7 1/2	8	8 1/2	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2	10 1/2	16	16	16	16	16	16	16		

Contributed by Walter B. Beebe

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Grate area	TABLE OF DIMENSIONS																					
	Grate area given in square feet. Other dimensions given in inches diameter																					
24	31	51	91	141	171	21	28	31	37	47	58	70	54	54	54	54	54	54	54	54	54	54
Safety valve	1	1 1/2	2	2 1/2	3	3	3 1/2	4	4	4 1/2	5	5	5	5	5	5	5	5	5	5	5	5
Main steam	1	1 1/2	2	2 1/2	3	3	3 1/2	4	4	4 1/2	5	5	5	5	5	5	5	5	5	5	5	5
Auxiliary steam	4	1	1	1 1/2	1 1/2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Feed pipes	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Bottom blow	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Surface blow	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Smoke stack	10	12	14	19	24	26	28	30	33	34	36	38	40	42	44	46	48	50	52	54	56	58

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